Positive Train Control (PTC) Working Group
Data & Implementation Task Force Meeting
June 2, 1999 - Newark, New Jersey

June 2: Data & Implementation Task Force Meeting convened at 1p.m.

·   Dean Hollingsworth opened the meeting with a Safety Briefing.

·   Ted Bundy asked the task force for comments on the April minutes. Tim DePaepe made a suggestion that on page 1, bullet #2 should read "Ted Bundy asked the task force for comments on the March minutes. There were no comments and the task force voted to accept the minutes as **they** stand."

Mr. DePaepe's other comment was on page 5, last bullet, third sentence, "The agency (FRA) is charged by Congress to **participate in development of** high speed corridors around the country, defining the requirement as to what systems will be needed for high-speed rail.

·   Ted Bundy asked the group for their completed ballots for the PTC Progress Report to the Congress. Barbara Hall has received four ballots prior to this meeting. Chuck Dettmann indicated that there are some blanks in the report.   He respectfully requests to see these completed in the report prior to voting.   Merrill Travis indicated that he did not want to vote on this report if the figures are going to change. Grady Cothen indicated that there were no hidden agendas, and he hoped that after all of this time we could take some things on faith.

·   The task force then began commenting on various portions of the report. These comments, and their resolutions, are included in the minutes as *Attachment No. 1.*

·   John Vogler briefly discussed the parameters of NJT's field demonstration, scheduled for the task force on June 3.

·   Rich McCord briefed the task force on the May 24, 1999 Human Factors Team meeting, using Dr. Raslear's report.
       - Have held three meetings
       - Action Plan Developed
       - Seven Action Items

Howard Moody stated that he does not think Dr. Raslear or his report portrays the intent or ideas of the entire Human Factors Team.

·   Ted Bundy briefly discussed the current status of the Operating Rules Team. The task force will continue this discussion on Friday, June 4, 1999.

June 2: Data & Implementation Task Force Meeting adjourned at 4 p.m.

June 4: Data & Implementation Task Force Meeting convened at 8 a.m.

·   Dean Hollingsworth opened the meeting by thanking John Vogler and NJT for the field demonstration of June 3.

· The report corrections matrix for the Progress Report to the Congress was discussed, and those task force members who weren't on the field trip of June 3 were provided copies.

· Grady Cothen advised the task force that the Progress Report to the Congress would be mailed to the PTC Working Group Members for a vote (either concurrence or non-concurrence only). After that, the full RSAC would be sent the report for the same kind of mail vote. Grady also noted that the report had been sent to the Standards Task Force at their May meeting in Pueblo, CO. No comments were received from the Standards Task Force.

· France Collard advised the group that she had called Dr. Sherry Borerner at Volpe, and got satisfactory answers to all of her questions.

· Bob Gallamore asked whether Fran Hooper's comments on pages 53 and 59 were in opposition to his. No one seemed to think this was the case. He advised that he would go through the report again, including Appendix C, and would provide updated data to Bob Dorer at Volpe for inclusion in the final draft of the report.

· Grady Cothen offered an explanation regarding the bs vs. ns notation in reference to one of Dr. Borener's tables. He said the bs notation was a mistake, and that ns stood for non-significant, which was an appropriate term and notation to use.

· The task force voted on acceptance of the Progress Report to the Congress, with the understanding that the items in the report corrections matrix were addressed, and unanimous consensus to accept the report was achieved.

· Frank Wilson announced that WABCO was merging with Motive Power Industries.

· Rich McCord reported on the reactivation of the Operating Rules Team. He said the team's first job would be to draft a task statement, and then briefed the task force on the one previous meeting the team had held, using *Attachment No. 2* of these minutes to explain where the team was headed. Chuck Dettmann took exception to the sentence stem for the bulleted items, and the stem was changed as noted in the attachment.

Howard Moody advised that he would contact NS and CSX and obtain names for their members, and would e-mail this information to Ted Bundy. Howard also provided electronic copies of the NS, CSX, and ATCS rules to Ted Bundy and Rich McCord. Howard advised he will e-mail a zipped copy of the GCOR to Ted. France Collard will provide Ted Bundy with an electronic copy of the CN rules.
Rick Inclima was added to the team to represent non-operating railroad employees, with Tim DePaepe designated as Rick's alternate. The ATDD will also assign someone to represent them on this team.

The next meeting of the Operating Rules Team will be held in Chicago, IL, (near the BRS Headquarters) for two full days, on September 22 and 23. Team members will likely have to travel in on September 21.

· The next meeting of the Data & Implementation Task Force will be in Pueblo, CO, the week of Oct. 25th (travel day), 10/26 & 10/27 all day, 10/28 until noon. FRA will attempt to contract with the new Marriott in Pueblo, but if that can't be accomplished, we'll move the meeting to Colorado Springs. **Bob Gallamore** will determine a large part of agenda, which will include a full management report on the IDOT joint project, and perhaps a field demonstration at TTCI.

Frank Wilson and Gary Pruitt will also brief the on the issue surrounding any test results on how dGPS correction data will be transmitted in PTC territory, including consideration of AC and DC locomotives, antenna capabilities to deal with high noise decibels, etc.

· Bob Gallamore gave a detailed status presentation on the IDOT Joint Program. The text used for this PowerPoint Presentation is included in these minutes as *Attachment No. 4.* Gary Pruitt also advised that this, and other reports on the progress of the IDOT Joint Program, were available at the following web site: http:// aarweb.arinc.net.

Gary advised that www (world wide web) should not be part of the address to get to this link, as this would cause the browser search to fail. The information on this site will be updated as the project progresses, and the PTC Data & Implementation Task Force can keep current by accessing this site from time to time.

· Frank Roskind briefed the task force on the current economic figures that would be included in the Progress Report to the Congress. There was some discussion about the delay costs associated with commuter railroads - $25 per hour versus the IDOT calculations of $75,000 per year income for households with commuter travelers. It was agreed to leave the current calculation as is.

Roskind promised to complete and deliver this data, for inclusion in the report, by cob Wednesday, June 9, 1999, to AAR and Volpe. This would include all tables with explanations in another appendix to the report.

Bob Dorer advised Roskind that his submission **must** reference specific pages and paragraphs of the current version of the report, and Volpe **must** receive all submissions and AAR comments no later than cob Friday, June 11, 1999. Volpe will make all necessary edits, including report and table formatting and grammatical corrections, and submit printed copies of the report to FRA in DC by cob July 9, 1999.
FRA will then FedEx the report to the **official voting** members of the PTC Working Group. All ballots must be returned to FRA either by fax or mail, no later than **July 23, 1999.** The report will be e-mailed to the PTC Data & Implementation Task Force by Ted Bundy upon receipt from Volpe.

Grady emphasized that everyone needed to be aware that it was the **responsibility of each of the organizations** to designate their voting members. FRA must have official notification to Vicky McCully of any revisions of their designations.

Vicky McCully will provide the official listing of the PTC Working Group members to Ted Bundy, who will then provide it to the Data & Implementation Task Force Members via e-mail.

· Ted Bundy asked the task force to focus on RSAC Task Statement 97-5 *(Attachment No. 3 of these minutes)* between now and the October meeting, and to be prepared to help decide the future direction of the task force. Grady Cothen emphasized that the task force should also be aware that the people working on the IDOT program, the CSX CBTM project, etc., needed time to work and this task force needed to consider this and to step back a bit if necessary.

Grady Cothen said that he would like to see suggestions from the individual task force members for consideration, regarding what the task force could do to support efforts such as the TTCI IDOT program, the CSX CBTM program, etc.

Time DePaepe said he was concerned that the IDOT joint program was not going to meet target deadlines. Chuck Dettmann said that was a good point; that the target dates must be malleable to get everyone's involvement up front, get all of the issues on the table, which would make the end process move more quickly and smoothly. Tim DePaepe said that the process is still bogged down, and that he didn't see much progress at this point.

Gary Pruitt, ARINC, said that there was now agreement to use upper levels of the ATCS specifications for code, but that there were disagreements over what kind of radios were necessary. Some PTC pilot projects have used different codes, but for specific reasons; and some people now believe this was a mistake. Merrill Travis, IDOT, said that codes were sometimes rewritten by suppliers to make the information proprietary.

· Grady Cothen gave a brief synopsis of the status of the Standards Task Force. He said they were making significant progress on performance standards for microprocessor based systems, including dealing with some regulatory gaps that FRA has to deal with. The task force anticipates making incremental changes in the existing Part 236 to modernize them, and is considering how we will facilitate the changes to ensure greater predictability.

Mr. Cothen also said that new methods of operation need to be developed for each system. He said the railroads would have to come forward with a two-tiered safety action plan for review. The Standards Task Force is struggling with how product safety plans should be handled, and that FRA was of the view that the authority to audit such plans could be "farmed out" to 3rd parties. FRA should be expected to audit these plans as appropriate.

Mr. Cothen said there was not generally agreement that FRA should single out some such plans for audit "upfront" as product review became necessary. FRA must be informed early in the process. FRA is seeking ways to limit its role of review and approval through guidance from its leadership, so that we don't "stand in the way". Currently, there is no way to limit the FRA role, and FRA does not perceive a way to limit some review and approval.

Mr. Cothen said that the process was complicated because of the need for interaction between the ASCAP team and the Human Resources Team; the Human Resources Team must provide input for Dr. Giras' model. This includes building some level of experience into the assumptions about human factors, making sure that the input assumptions are reasonable.

· Mr. Cothen mention the NPRM, which needs to be finished and published by the end of the year to meet the Administrator's desire to move the rulemaking forward. We will need to assume success at the NPRM stage, because the ASCAP tool kit will not yet be available.

Mr. Cothen pointed out that the verification and validation associated with meeting performance criteria was costly, and we need to make this is feasible and work for simplification where we can. There are consequences both for FRA and for the industry.

· Howard Moody added that the industry and other members wanted some reality entered into the ASCAP process. Without having to get statistics from each rail line, etc…, to get some national organization to make a suitable assessment. He suggests "use cases", so no on will misunderstand what is going to happen in the process before publication of the NPRM.

Grady Cothen stated concerns about doing something of this nature before the NPRM. Howard was concerned about people being confused about plans, and want to make there is agreement.

Someone mentioned that the BRS brought materials to the Standards Task Force for inclusion, and that management had agreed to integrate this into the proposed rule text. Joe Mattingly, BRS, has more information to provide at the next Standards Task Force meeting.

June 4: Data & Implementation Task Force Meeting adjourned at 11 a.m.

DRAFT

DRAFT

Page Ref

Issue
Party
Resolution

DRAFT

Items on John V's table
John Volger's
Will take John's corrections. See last page of this document.

06 - vi, x
Exec. summary blanks
BRS, AAR
> Page vi: McCord provided the following numbers for all Level 3 (Yes's only): Killed - 7, Injuries - 55, Damages - $20,631,111

06- vi
Cleanup edit
"

06- vi
"Roadway work protection" should read "roadway worker protection"
Inclima
Volpe editor to handle.

10 - x
$230 m vs $587 m on pg 85, which should be $591 m
Dettmann
Needs to be reconciled to $591 m.

13 - xiii
Copy fn from 13 and put on 5d
Rick Inclima

13 -xiii

Need footnote # 24, page 13, inserted to reference 5(d).

Inclima

Volpe editor to handle.

14 - xiv

Delete examples after "by other means" in para. 8

AAR

Accepted

14 - xiv

Item 8: GX, last part of sentence beginning with "such as" to be replaced with language in 3rd paragraph of page 36.

Dettmann

Volpe will do

18

Add "locomotive" in front of the word "engineer", two instances in last paragraph

Horstman

Volpe editor to handle.

28

CBTM vs. rdwy equip in motion

Inclima

No change required. Clarification only

41

Revise 2nd sentence of 1st paragraph

Dettmann

 New sentence will read: Introducing technology that motorists that motorists may learn to rely upon, but that is not fail safe, could actually degrade safety.

51

Clarify or drop 2nd sentence of "d"

Gallamore

Sentence deleted "Therefore the definition…."

51

Numbers not defined, Section D

X = 61, Y = 1922, Z = ??, Volpe will handle.

52

Levels don't correspond

Collard

Volpe will handle.

52

Delete or clarify 1st paragraph

Gallamore

Volpe will handle.

52

Types of derailments that are PTC preventable aren't clarified

Gallamore

 Gallamore will provide words that can be used to avoid misunderstandings about which derailments are PTC preventable.

53

Clean up table formatting

Dettmann

Volpe will do.

53

Don't understand table

AAR /Thelen

Bob to provide clean table / cite minutes

54

Numbers in 1st paragraph need to be checked, not correct

French & others

Volpe will correct.

54

Last 2 paragraphs are historical rather than predictive.

French

 The historical costs of PTC - preventable accidents are concentrated at a handful of locations experiencing catastrophic PPSs. However, that concentration does not necessarily imply that future PPA costs will be concentrated at the same locations. To predict the future PPA locations, one must employ a model that relates network and link characteristics (eg. - curvature, train volume, etc.) to PPA experience. That is what CRAM does.

55

Phase "government's willingness" is misstatement
Moody
Revise to read "government's estimate of society's willingness to pay"

56
CRAM / passenger vs. freight
Gallamore
Bob Gallamore to provide.

59
Table and conclusions don't fit correctly
Collard
France will discuss with Dr. Borener.

59
CRAM / passenger factor
APTA / Fran Hooper
OK–table will show factor not significant

61
2nd sentence on page not deleted, as intended.
Collard
Delete sentence

62
Add "estimated" before the word "values" in the chart reference
Borener
Volpe to handle.

63
3rd paragraph from bottom, 1st sentence; delete the words "and the traffic mix in some cases"
Borener
Add in their place "as expressed the log squared of the total trains per year."

64
the word "What" is hanging
Collard
Volpe will delete the word "what"

67
Delete 5A, re-number rest of the section

Pruitt

Volpe editor to handle.

67

Material needs to be stricken / never drafted

Pruitt

OK; need to conform the rest

73-74

Passenger Trains - Paragraph is confusing and needs to be revised

Travis

Roskind to revise paragraph

73-74

Merrill Travis

Frank

75

10% costs

French

The 10% maintenance costs as referenced on Page 75 needs to be incorporated in the PTC cost table - Frank Roskind

82

FRA has informed the Committee

82

2nd paragraph - what value does this paragraph have

Dettmann

Will change report to indicate that "FRA has concerns", Grady Cothen

83

ARES edit /clarification

Ditmeyer

   Section C, last sentence of 1st paragraph will now read "In a March 1991 technical evaluation, Stanford Research International *(now SRI),* reported that, *if a planning system were installed as an integral part of the ARES type system,* 70 % of the total benefits of the ARES (PTC) functions could be achieved through the planning system - the "largest contributor to the net present value…."."

84

Section "f" doesn't read correctly because of the references to productivity

Gallamore

Frank to revise the paragraph.

85

Wants the benefits/costs in the Exec. Summary as well as on this page; the safety benefits need to be added to page 85 first. Also needs to include the 10% maintenance factor, as noted on page 75

Dettmann

Roskind to complete, Cothen will pull into Exec Summary and give to Volpe.

86

Section G should say safety benefits and not reference all benefits.

Gallamore

Roskind to handle.

A-6

Def'n /signal aspect

Collard

Done (combine two definitions as discussed)

A-6 (Glossary)

2 definitions of signal indication.

No definitions for System Integration and System Configuration Management

Collard

One definition: Revised to read "The information conveyed by the aspect of a fixed signal or cab signal."

To be dropped from the glossary

Appendix C, pg. 36

Old write-up

Wilson

Revise to read "CSXT has a contract with Wabco Railway Electronics…"

Appendix C, pgs 18 to 21

Old write-up

Gallamore

Will provide new Ill. project description.

CRAM

Several comments that CRAM section needs cleaned up, table titles and their citations in text.

Collard and others

Volpe editor to handle.

Note: Need tables showing benefits of PTC at each level for Class I application, with and without maybes.

APTA/NJT COMMENTS June 1999 Draft

"Implementation of Positive Train Control Systems"

p. vi Last paragraph—no statistics for PPA's.

p. x Paragraph item 7—no cost information for Nation's rail lines for Level 3.

p. xi In second bullet item, the phrase about "inflated" price quotations was discussed in Kansas City; should read like: "Price quotations for PTC applications are likely to be reduced in larger quantities."

p. 4 Second paragraph lacks intercity ridership growth number.

p. 29 For consistency, heading 4 should read "Emerging Developments".

p. 30 Second full paragraph: sentence that reads: "NSLS limitations include the lack of¼ " conflicts with previous paragraph. Wording agreed to was "NSLS *does not use* information *from the* signal *system, nor does it monitor* switch positions and movement authorities."

p. 30 Third paragraph from bottom: maintenance-of-way employees should be "roadway workers".

p. 30 Second paragraph from bottom: ends with demonstrate; agreed to "implement".

p. 51 Paragraph d.: corridor numbers are not provided.

p. 55 Second paragraph, third sentence agreed to read: "Models were estimated for all four levels of PTC preventable accidents." In the next sentence, "prediction" should be changed to "estimate".

p. 55 Paragraph a.—"the government's willingness to pay" was to be changed (to society's?).

p. 55 Paragraph b.—"is estimated" should read "was developed".

p. 59 Row for ptrnrat has 6 columns with "bs" entries; these are not defined.

p. 61 Freight Train Costs HIGH/LOW rows appear to be reversed.

p. 62 Last line: "advanced (delete)" should be deleted.

p. 83 Network Planner is not relevant for commuter railroads with high density - high frequency service, but may be relevant for low density - low frequency freight service. Therefore, $17,000 savings per locomotive would not apply in general in commuter territory.

p. A-3 "Cluster Controller" definition references BCPS which are not defined; Mobile Communications Package (MCP) is.

PTC OPERATING RULES TEAM MEETING - NOVEMBER 16, 1998
(see revised sentence stem of 6/4/1999, at the PTC Data & Implementation Task Force meeting)

Rich McCord opened the meeting at 11:00 am. The following people were present in the room: Gary Pruitt, Bob Harvey, James Stem, Gerhard Thelan, Larry Milhon, Rich McCord, John Vogler, Bill Clifford, Ted Bundy, Doug Horstman, Bob Ralph.

The purpose of this meeting was to draft a portion of the PTC Report to Congress. This team will also draft models of proposed operating rules for interface of man/machine issues, and the implementation of PTC systems.

This group was created to *__consider operating rules or other criteria__* *(revised 6/4/1999)* to insure:
- π **Safe operation during the interim period while implementation of the systems is taking place**
- π **Training of engineers and conductors**
- π **Techniques to insure the proficiency of the engineer remains at a high level**
- π **Rules to prohibit intentionally allowing the "system" to control the train, instead of normal operations - prohibit inappropriate use of system - If the system is intended to control train in certain areas, that would not be inappropriate use**
- π **Rules for handling non-equipped trains, to allow for the migration of a new PTC system over an older system -**
- π **Operating rules that can be used with various PTC Configurations**
- π **We do not want a PTC system to replace the reliance on Operating Rules**

DRAFT

Railroad Safety Advisory Committee
Task Statement:
Positive Train Control (PTC) Systems—
Implementation Issues

Task No.: 97-5
Date presented to the RSAC: September 30, 1997

Purpose: To address any remaining issues regarding the feasibility of implementing fully integrated PTC systems, evaluate factors that may guide decisions on how PTC could yield optimum benefits in relation to costs, and determine the timetable over which such systems could be deployed...taking into account the need to first complete testing and revenue demonstration of any new system.

Description: Complete analysis as indicated in the "purpose" statement above; report recommendations to the Administrator. Consider the following issues:

·   Application to both freight and passenger lines

·   Technical readiness; steps required to deploy

·   Coordination of public and private sector transportation needs

·   Priorities and pace of development (recognizing safety and business needs to promote investments with optimum returns in societal benefits)

·   Proposed migration strategies

Source: FRA Report to Congress entitled "**Railroad Communications and Train Control"** (July 1994) and recommendations of the National Transportation Safety Board.

Refer to/establish the following working group (or task force):

Coordination:

Target dates: Provide status report with timetable to full committee by meeting of January 27, 1998.

Disposition: Accepted   **Date:** September 30, 1997

North American PTC Joint ProgramPresentation to the RSAC
                              Robert E. Gallamore
                              Program General Manager

                              PTC Communications Workshop

                         WCTF Interoperability Requirements

Issue
   _What Specifics Will WCTF Address In Its RF Link Interoperability Recommendations For PTC?
Action
   _WCTF Requested To Propose Draft Stds For:
      _Small Packet Low Message Volume
      _Small Packet High Message Volume
      _Large Packet Low Message Volume (intermittent)
      _[Optional] Receipt Of DGPS Corrections
   _May Be The Same Or Different Com Links

                         Cost-Effective Wireless Standards

Issue
   _How Do We Get To Cost-Effective Interoperable Standard(s) For The PTC Wireless Communications Link?
Action
   _Consensus It To Use OSI Layers 3-6 (Address Part Of 3)
   _ WCTF Will Provide Draft Recommendations Near And Long Term Standards By October 1999

                    Not More Than Two Com Technologies For Wide Area Com

Issue
   _To Be Cost Effective, PTC Systems Should Not Be Specified To Support More Than Two Communications
    Technologies /Protocols For Wide Area Coms.
Action
   _Identify Which Communications Technologies /Protocols Will Support The Core PTC Functionality And
    Interoperability Requirements

                    Improved /New Technologies For Wide Area Communictions

Issue
   _Data Throughput And Capacity Optimization On RR Frequencies And Alternatives
Action
   _WCTF Analysis & Recommendations (ODOT Project)
   _ PTC Program Office Commission Study For Higher Baud Rate For 900 Mhz Radios

_ WCTF Continue Investigation Of Other Technologies (Software Radio, etc.)

Technologies For Low-Volume Data

Issue
_Find A Very Low Cost Solution For Near Term Low Volume Data Applications
Action
_WCTF Review DOV And Analog LVD Options For Possible Inclusion In Standards Proposals

Large Packet Data Transfer

Issue
_PTC In All Territories Will Require Rapid, High Volume Data Upload Capability, Preferably Compatible With Non-PTC Uses
Action
_ARINC Will Study/Recommend Options To Meet Near-Term Requirements In the IDOT Study Corridor As Well As Options To Meet Overall PTC Requirements, including wireless options (e.g. PC card)

Business vs PTC Use

Issue
_Should We Consider A RF Link(s) For Both Business And PTC Use?
Action
_Program Team Require A Cost-Effective Solution In The SDI RFP
_ WCTF Consider Both Business And PTC Requirements In Long-Term AAR Communications Standards

Interoperable Radios

Issue
_Which Radios Need To Be Interoperable And Which Do Not?
Action
_Near Term. WCTF Recommendation For Inclusion In IDOT SDI RFP.
_ Long Term. WCTF Decision And Standards Modification Process

Cost-Effective Migration Options

Issue
_Given Existing RR Coms Infrastructure, "Refarming" And Rapid Emergence Of New Technology, PTC Deployment Depends On Cost-Effective Migration Options
Action
_WCTF Proposal For AAR Standards Will Include Consideration Of Migration Options.
_ RFP For IDOT SDI Will Include Analysis Of Migration Options

Migrating From Low- To High Speed Networks

Issue

_How Do We Migrate From Low Speed (Version 1) Channels To High Speed (Version 2) Channels On The Same Network?

Action

_WCTF Develop "Use Cases" As Part OF Standards Recommendations Process

IDOT RF Solutions

Issue

_RF Solution(s) Needed For IDOT Prototype And Demonstration

Action

_Project Team And IDOT Managers Work With UPRR And AMTRAK To Develop The RFP For System Development/Integration (SDI) And Physical Infrastructure Upgrades (e.g., UHF Build-Out, APCO-25, etc.)

Implementing Shared Networks

Issue

_How Do We Implement Shared Networks?

Action

_WCTF Consider A Pilot Project, Perhaps As A Follow-on To ODOT Work.

Antennae Forest

Issue

_Are Multiple Radios /Antennae On Board Locomotives
  _A Technical Necessity At This Time?
  _A Real Problem For PTC Interoperability And Cost-Effectiveness?

Action

_ARINC Address In Systems Requirements And RFP For IDOT System
_ WCTF Address Current /Future Costs And Capabilities Of Software Radio

Multipath Router vs. Software Radio

Issue

_What Are The Pros And Cons OF RF Multipath Router Scheme vs. Software Radio (SDR) Solution.

Action

_ARINC And WCTF To Consider In Trade Studies For Standards Development

Short Range Data Transfer

Issue

_Need Feedback To Jack Bailey On ITS 5.8GHz DSRC Idea (fixed to mobile) And To Eric Pelli On 802.11(fixed to fixed) Option

Action

_E-mail Jack At jbailey@arinc.com or Eric at epelli@arinc.com
_ Program Staff Attend ITS July Grade Crossing Workshop And Consider DSRC As Data Transfer Option For IDOT SDI RFP

Input To June Workshop

Issue
_What Outputs From This Workshop Need To Be Presented At The Data/Location/Braking Workshop In June?
Action
_ARINC Distributes Summary Of Communications Workshop To Attendees (See WEB Site)
_ Overview At June Workshop Will Address Overlap Issues From Communications Workshop

Managing RR Spectrum

Issue
_RRs Preferential Status From FCC Demands High Quality Performance Of Frequency And Spectrum Management Functions
Action
_TTCI (AAR) To Move Forward To Phase II (Build Phase) Of Both Frequency Management And Spectrum Management Toolsets.
_ TTCI And WCTF Develop Proposal For Incentive Fee Structure Aimed At Maintaining Spectrum Efficiency.

Availability Of 700MHz Spectrum

Issue
_Will RRs Be Able To Get Spectrum At 700MHz (TV Channels 60-69), And What Protocols And Equipment Would Be Used?
Action
_WCTF (T. Keller) Continue To Monitor Possibilities And Propose Actions
_ If Warranted, WCTF Investigate Protocol And Equipment Options

PTC Locomotive Electronics Workshop

Workshop Conclusions

_The LSI specifications do not reflect the current technical directions of the locomotive suppliers.
_No Defect Found problems on locomotives have been increasing, and the new generation of locomotive electronics design has to address this problem.
_Some of the railroad mechanical departments wish to achieve interchangeability (not just interoperability) of locomotive electronics. The requirement for interchangeability is distinct from the requirement for PTC interoperability across railroads.

Workshop Conclusions

_To be practical and cost-effective, PTC must support a migration plan that addresses incremental implementation of

capabilities and migration from current products and infrastructure.

_The newest locomotives have features that make them "PTC-compatible" in terms of incorporating GPS systems, capabilities to interface to a PTC onboard platform or incorporate PTC functions within the locomotive computer platform, interfaces to the brake system, ability to display PTC information, and open architecture to add new subsystems or software objects.

Workshop Conclusions

_New and retrofit ("classic") locomotives can be addressed separately in planning PTC onboard systems

_PTC requirements need to be defined in detail to ensure that railroad needs are satisfied by PTC products.

_Different PTC implementations may be able to be supported, but train-wayside messages and associated stimulus/ response characterization needs to be standardized.

Workshop Conclusions

_Safety Verification and Validation of PTC will require an industry standard and will be complicated by mixing PTC with other locomotive functions, or by having PTC functionality distributed across system elements (modules, boxes, objects) developed by different suppliers.

_Configuration management of PTC products and specifications will require a long-term commitment and judicious management, particularly if products from different suppliers are mixed.

Workshop Conclusions

_PTC and other locomotive electronics can share a single source of data, such as velocity, location, or interface to the brake system. This will reduce the costs and complexity of locomotive electronics, and of PTC systems, which will use these common data and interfaces.

_More input is needed from railroad operators and maintainers to ensure PTC systems will be maintainable, logistically supportable, and of practical design.

Workshop Conclusions

_Extensibility, the ability to add new functionality with little or minimal impacts on existing functions or systems, must be supported in future locomotive electronics configurations. This design characteristic is essential to ensuring that the system architecture can support system functionality not known at this time.

_Interoperability must also support supplier or railroad-specific functions. For example, the PTC message set must support non-PTC functions as well as PTC functions.

Workshop Conclusions

_Technology convergence on the locomotive is needed to make PTC cost effective.

_Lessons-learned from earlier standards programs, including LSI, should be documented and evaluated.

_PTC standards need to define PTC functions, performance and interfaces, including messages and data elements that

make up the messages, and stimulus/response characterization.

Workshop Recommendations

_The LSI specifications should be updated, taking into consideration the new locomotive electronics architectures as being implemented by the locomotive suppliers, and options for integration of PTC into the locomotive electronics.

_Migration of the LSI architecture to the types of databus interfaces being implemented by EMD and GE Harris can be accomplished in stages to accommodate current LSI products.

Workshop Recommendations

_A permanent industry standards organization should be formed, to address standards and integration of all interfacing electronics systems. The standards organization should also address configuration management of different systems configurations.

_A standard for safety verification and validation should be developed to define requirements for safety analyses and testing during system design, deployment, operation, and maintenance.

PTC Location/GIS/Braking Workshop

Location System Issues

_What are the location system accuracy and integrity requirements for PTC? What are the parameters that must be specified to completely characterize the requirements?
_Can the PTC location system requirements be satisfied by a combination of dGPS, an onboard track database, and auxiliary sensors? What other data may be required?
_What information transfer is necessary between wayside and train as the train is moving to validate train location (such as switch setting)?

Location System Issues

_Are there any issues associated with latency of location calculations (including GPS) that impact the safety criticality of PTC location determination?
_What is the time criticality of receiving dGPS correction data (i.e., how often must dGPS corrections be received onboard the train?
_If dGPS correction data is sent to the train by UHF or VHF datalink to avoid EMI problems on the locomotive at 300 kHz (the NDGPS beacon frequency), are there latency or error build-up problems that must be addressed?

Location System Issues

_Should mobiles (trains, other vehicles, roadway workers, etc.) report their location in lat/lon (GPS coordinate) format, milepost, or other format?
_What is the appropriate location system technology to specify for PTC? Can the requirements be stated in a way that

is technology-independent? If so, how will interoperability be impacted?

Track Database Issues

_What data is required to characterize the track infrastructure for location determination purposes?
_What is the estimated size of a track database per 100 track miles?
_Is the data currently available on track infrastructure of sufficient quality for brake enforcement purposes?
_Is an industry standard needed to define the survey required to generate this data? If so, does anyone have a strawman survey standard or procedure to proffer?

Track Database Issues

_Is an industry standard needed for Configuration Management of track configuration data to ensure the quality of the data for safety critical applications such as brake enforcement?
_Is it necessary to transmit the database to a train at the beginning of a route, or can it be transferred in increments? If it can be done in increments, are there any restrictions or rules regarding the data transfer that need to be standardized for interoperability?

Consist Data Issues

_What data is required to characterize the train consist for brake enforcement calculation purposes? For determining location of rear of train?
_How accurate is consist data in UMLER and at individual railroads?
_Is the available train consist data of sufficient quality for PTC brake enforcement purposes? What is the relative impact of the accuracy of this data on brake enforcement accuracy?

Brake Enforcement Issues

_Which of the following options should be selected for PTC brake enforcement:
   _Onboard calculation of the brake enforcement curve
   _ Offboard calculation of the brake enforcement curve, with transmission of the enforcement initiation location with the authority
   _ Pre-definition of a limited number of brake enforcement distances (say 6-8) based on train characteristics, and transmission of the appropriate identifier with the authority
   _ Some other method of determining the brake enforcement warning and brake initiation locations.
_Is it necessary or desirable to have a standard brake enforcement algorithm, or is it sufficient to standardize the data (messages) that will be used in the algorithms?

Brake Enforcement Issues

_Has anyone encountered problems with onboard brake enforcement algorithms that should be known before deciding on an industry standard approach for PTC:
   _Data quality
   _ Onboard processing power/speed

    _ Sizes of messages or databases required

    _ Other factors

_What is the relative impact of the different sources of ambiguity or error on actual stopping performance – track topology, train consist, brake types, brake rigging performance, other brake system components, air brake pressure propagation time variations, other variables?

Brake Enforcement Issues

_How much of a safety buffer should be included in the PTC brake enforcement algorithm? Should this be a fixed distance, or variable based on train speed or other parameters?

_What is the nature of the statistical distribution of braking distances, including repeatability? How should this variability be addressed in defining PTC brake enforcement standards?

_Is their any reason that standards for brake enforcement could not apply to all types of PTC implementation?

_How should PTC be integrated with LSI standard onboard electronics?

GIS Issues

_What location reference standard should be used for PTC?

_Is it feasible and realistic to select a standard location reference for PTC that will be applicable to other railroad GIS applications? What are the potential barriers to selecting one standard?

_What industry Configuration Management and other standards are necessary for PTC that relate to GIS references or applications?

GIS Issues

_If a GIS mapping system is used for train tracking for PTC, what are the issues related to ensuring that errors are not introduced in data translation or other processing between the train and the central office that will impact safety? (This includes the situation where a train from one railroad is reporting to a central office location display of a different host railroad.) How should these issues be addressed? Are industry verification and validation (V&V) standards required or appropriate?

_How should the industry address verifying the correspondence of survey data with locations as registered on a map display or in train tracking algorithms? (To guard against errors in location data as surveyed in the field as compared to train location determination onboard the locomotive and in central office software.)